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09/380,864	12/02/1999	MARTYN VINCENT TWIGG	JMYT-V00200	3166

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EXAMINER

LEUNG, JENNIFER A

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1764

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/380,864	Applicant(s) TWIGG, MARTYN VINCENT	
	Examiner Jennifer A. Leung	Art Unit 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on March 27, 2007 has been received and carefully considered. Claims 1-8, 12, 13, 16-20, 24, 25, 28 and 31-33 are cancelled. Claims 38-50 are newly added. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-50 are under consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rembold et al. (US 5,665,318) in view of Ishibashi et al. (US 5,330,732) and Keith et al. (US 3,331,787).

Regarding claims 9, 34-36, 38 and 50, Rembold et al. (FIG. 1; column 3, lines 20-34) discloses a lean burn diesel engine (an engine, with cylinder 1, consuming diesel fuel from tank 15; evidenced by column 4, lines 8-13) in combination with an emission control system, the emission control system consisting of:

a lean NOx catalyst system (reduction catalyst 11; column 4, lines 15-68);

an oxidation catalyst system (oxidation catalyst 12; column 3, lines 29-34); and

means (metering valve 23 with device 26) for injecting hydrocarbon fuel (from fuel tank 15) into the exhaust upstream of the lean NOx catalyst system 11;

where the lean NOx catalyst system 11 is disposed upstream of the oxidation catalyst system 12.

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Rembold et al., however, is silent as to the lean NOx catalyst system **11** and the oxidation catalyst system **12** each having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of $< 30 \text{ g/ft}^3$, a component selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30), and a support (see column 2, lines 23-30; also column 4, lines 49-68). It would have been obvious or one of ordinary skill in the art at the time the invention was made to substitute the lean NOx catalyst system of Ishibashi et al. for the lean NOx catalyst system **11** in the apparatus of Rembold et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NOx catalyst system for another known lean NOx catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal (see column 3, line 50 to column 4, line 2); a component selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2); and a support (see column 1, line 60 to column 2, line 3). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system **12** in the apparatus of Rembold et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long

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life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40).

Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 10, 11, 39 and 40, the collective teaching of Rembold, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified apparatus of Rembold et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). Because the modified apparatus of Rembold et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering

the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 14 and 41, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claims 15 and 42, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate loading of platinum group metal to be contained in the oxidation catalyst system in the modified apparatus of Rembold et al. (such as the recited amount of about 100 g/ft³), because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, numerical ranges that overlap prior art ranges were held to have been obvious. *In re Wertheim* 191 USPQ 90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

Regarding claims 21, 37 and 43, Rembold et al. discloses a process for the control of emissions from a lean-burn internal combustion engine (i.e., a compression-ignition internal combustion engine utilizing diesel fuel 15; column 4, lines 17-27), said process consisting of: passing exhaust gas from the engine over a lean NO_x catalyst system (reduction catalyst 11;

column 4, lines 15-68);
passing the product gases exiting from the lean NO_x catalyst system over an oxidation catalyst system (oxidation catalyst **12**; column 3, lines 29-34); and
introducing additional hydrocarbon fuel (from tank **15**) into the exhaust gas (via metering valve **23** with device **26**) before the exhaust gas contacts the lean NO_x catalyst system **11**.
Rembold et al., however, is silent as to the lean NO_x catalyst system **11** and the oxidation catalyst system **12** each having the instantly claimed components.

Ishibashi et al. teaches a lean NO_x catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of less than 30 g/ft³, a component selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30), and a support (see column 2, lines 23-30; also column 4, lines 49-68). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the lean NO_x catalyst system of Ishibashi et al. for the lean NO_x catalyst system in the process of Rembold et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NO_x catalyst system for another known lean NO_x catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal (see column 3, line 50 to column 4, line 2); a component selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48

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to column 6, line 2); and a support (see column 1, line 60 to column 2, line 3). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the process of Rembold et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40).

Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 22, 23, 44 and 45, the collective teaching of Rembold, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified process of Rembold et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). Because the modified process of Rembold et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different

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and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 26 and 46, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claims 27 and 47, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as the recited amount of about 100 g/ft³) in the modified process of Rembold et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 29, 30, 48 and 49, Keith teaches that for auto exhaust purification and other applications using unitary ceramic catalysts, space velocities may range from about 3,000

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hr^{-1} at idle conditions to about $250,000 \text{ hr}^{-1}$ at acceleration or cruising. Preferably, the space velocity is within the range of $30,000 \text{ hr}^{-1}$ to $120,000 \text{ hr}^{-1}$. (column 8, lines 20-32). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to pass the exhaust gas over the catalyst systems within the claimed ranges in the modified process of Rembold et al., because the claimed space velocities would have been considered conventional for exhaust gas purification, as evidenced by Keith. Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate space velocity for each of the lean NO_x catalyst system and the oxidation catalyst system in the modified process of Rembold et al., because the specific space velocities would have been considered a result effective variable, and one having ordinary skill in the art would have routinely optimized the space velocity for each of the systems on the basis of the desired catalytic reactivity for each system, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980). In addition, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

3. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lane et al. (US 5,522,218) in view of Ishibashi et al. (US 5,330,732) and Keith et al. (US 3,331,787).

Regarding claims 9, 34-36, 38 and 50, Lane et al. discloses a lean burn diesel engine **12** in combination with an emission control system **10** (see FIG. 1; column 2, lines 62-67), said emission control system consisting of:

- a lean NO_x catalyst system (i.e., a deNO_x catalyst in converter **13**; column 3, lines 2-5);
- an oxidation catalyst system (i.e., an oxidation catalyst, not shown, located downstream

of the deNOx catalyst; column 3, lines 5-7 and 15-17) ; and means (i.e., injector **20**) for injecting hydrocarbon fuel into the exhaust upstream of the lean NOx catalyst system.

Lane et al., however, is silent as to the lean NOx catalyst system and the oxidation catalyst system each having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of less than 30 g/ft³, a component selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30), and a support (see column 2, lines 23-30; also column 4, lines 49-68). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the lean NOx catalyst system of Ishibashi et al. for the lean NOx catalyst system in the apparatus of Lane et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NOx catalyst system for another known lean NOx catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal (see column 3, line 50 to column 4, line 2); a component selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2); and a support (see column 1, line 60 to column 2, line 3). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the

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invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the apparatus of Lane et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40).

Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 10, 11, 39 and 40, the collective teaching of Lane, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified apparatus of Lane et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). Because the modified apparatus of Lane et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate

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temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 14 and 41, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claims 15 and 42, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as an amount of about 100 g/ft³) in the modified apparatus of Lane et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 21, 37 and 43, Lane et al. discloses a process for controlling the emission from a lean burn internal combustion engine (i.e., lean burn diesel engines; column 2, lines 62-67), the process consisting of:
passing exhaust gases from the internal combustion engine **12** over a lean NO_x catalyst system

(i.e., a deNOx catalyst contained in converter **13**; column 3, lines 2-5);
passing the product gases exiting from the lean NOx catalyst system over an oxidation catalyst
system (i.e., an oxidation catalyst, not shown, located downstream of the deNOx catalyst;
column 3, lines 5-7 and 15-17); and
introducing additional hydrocarbon fuel (HC **25** via injector **20**) into the exhaust gas before the
exhaust gas contacts the lean NOx catalyst system.

Lane et al., however, is silent as to the lean NOx catalyst system and the oxidation catalyst
system having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a
platinum catalyst present at a loading of less than 30 g/ft³, a component selected from the group
consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt
catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and
column 3, lines 11-30), and a support (see column 2, lines 23-30; also column 4, lines 49-68). It
would have been obvious for one of ordinary skill in the art at the time the invention was made
to substitute the lean NOx catalyst system of Ishibashi et al. for the lean NOx catalyst system in
the process of Lane et al., on the basis of suitability for the intended use, because the substitution
of known equivalent structures (i.e., one known lean NOx catalyst system for another known
lean NOx catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532
(CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA
1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21)
consisting of a platinum group metal (see column 3, line 50 to column 4, line 2); a component

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selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2); and a support (see column 1, line 60 to column 2, line 3). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the process of Lane et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40).

Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 22, 23, 44 and 45, the collective teaching of Lane, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified process of Lane et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). Because the modified process of Lane et al. comprises each of the instantly claimed elements,

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one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 26 and 46, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claims 27 and 47, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as an amount of about 100 g/ft³) in the modified process of Lane et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, numerical ranges that overlap prior art ranges were held to have been obvious. *In re Wertheim* 191 USPQ

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90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

Regarding claims 29, 30, 48 and 49, Keith teaches that for auto exhaust purification and other applications using unitary ceramic catalysts, space velocities may range from about 3,000 hr^{-1} at idle conditions to about 250,000 hr^{-1} at acceleration or cruising. Preferably, the space velocity is within the range of 30,000 hr^{-1} to 120,000 hr^{-1} . (column 8, lines 20-32). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to pass the exhaust gas over the catalyst systems within the claimed ranges in the modified process of Lane et al., because the claimed space velocities would have been considered conventional for exhaust gas purification, as evidenced by Keith. Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate space velocity for each of the lean NO_x catalyst system and the oxidation catalyst system in the modified process of Lane et al., because the specific space velocities would have been considered a result effective variable, and one having ordinary skill in the art would have routinely optimized the space velocity for each of the systems on the basis of the desired catalytic reactivity for each system, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980). In addition, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Response to Arguments

4. The rejection of claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-36 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement has been withdrawn, in view of Applicant's amendments to claims 9, 21, 34 and 36.

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5. Applicant's arguments filed on March 27, 2007 with respect to the rejection of claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 under 35 U.S.C. 103(a) have been fully considered but they are not persuasive.

Comments regarding the rejection of claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 under 35 U.S.C. 103(a) as being unpatentable over Rembold et al. (US 5,665,318) in view of Ishibashi et al. (US 5,330,732) and Keith et al. (US 3,331,787)

Applicant (page 11, line 5 to page 12, line 9) argues that Ishibashi et al., when considered in its entirety, fails to teach, disclose, or suggest the instantly claimed feature of, "a platinum catalyst for reducing NO_x to N₂ present in the lean NO_x catalyst system at a loading of < 30 g/ft³". In particular, Applicant argues that although Ishibashi et al. presents examples of NO_x catalysts having a Pt loading of < 30 g/ft³ (e.g., in Tables 1 and 4: Pt loadings of 0.17, 0.18, 0.44, 0.49, 0.94, 0.95 and 0.99 g/l), Ishibashi et al. teaches away from this feature since it is disclosed that the Pt should be present at a loading of 1.3 parts by weight or more with respect to 100 parts by weight of the zeolite (discussed at column 2, lines 59-68), which appears to correspond to a Pt loading of > 30 g/ft³.

The Examiner respectfully disagrees. Please note that disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). In addition, a known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use. *In re Gurley*, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). Applicant has asserted no discovery beyond what was known in the art.

Furthermore, it has been held that the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). When a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result

Applicant (page 12, lines 9-16 and page 12, line 27 to page 13, line 6) further comments on the “grossly inadequate effect of loadings lower than 1.3 parts by weight or more of platinum for converting nitrogen oxides after being subjected to a high temperature durability test”.

However, it is noted that the percent NO_x conversions being disclosed in Ishibashi et al. (e.g., at Pt loadings of 0.18 and 0.49 g/l in Table 1) are not much different from the percent NO_x conversion exhibited by Applicant’s own NO_x catalyst. For example, Ishibashi et al. discloses that for the Pt on Na-ZSM-5 catalyst, at Pt loadings of 0.18 g/l and 0.49 g/l, the % NO_x conversion B.D. (before durability testing) is approximately 29 and 48, respectively, and the % NO_x conversion A.D. (after durability testing) is 0 and 7, respectively. Comparing these values to Applicant’s own disclosure, it is noted that the % NO_x conversion of approximately 25.4 (i.e., for Lean-NO_x Catalyst (3), with a Pt loading of 25 g/ft³, fresh and without aging; see TABLE 3 and corresponding discussion) is similar to the % NO_x conversion values exhibited by the Ishibashi et al. catalysts before durability testing. Because Applicant’s lean NO_x catalyst contains the same components as Ishibashi et al.’s lean NO_x catalysts, one of ordinary skill in the art would have expected Applicant’s lean NO_x catalyst to similarly exhibit very low NO_x conversion (e.g., close to 0 and 7 percent) after being subjected to aging or durability testing.

Clearly, one of ordinary skill in the art would have found it obvious to weigh the advantages and disadvantages of utilizing a heavily loaded NO_x catalyst versus a lightly loaded NO_x catalyst in a given situation. For instance, a heavily loaded NO_x catalyst may exhibit increased durability and NO_x conversion, but the use of a large amount of precious metal would be very costly. Furthermore, although a lightly loaded NO_x catalyst may exhibit lower durability and NO_x conversion relative to the heavily loaded NO_x catalyst, the use of a smaller amount of precious metal would be less costly.

Lastly, Applicant (at page 13, lines 11-24) argues that Ishibashi et al. teaches away from the combination of a lean burn engine and emission control system, where the engine is a diesel engine. Applicant bases this assertion on the teaching that Ishibashi et al. subjects his lean NO_x catalyst to aging at 800 °C, whereas diesel engines do not reach 800 °C.

This argument is not found persuasive. Please note that 800 °C is not the operating temperature of the catalyst. It is merely the temperature used to age the catalyst during the Durability Test. The lean NO_x catalyst is intended to be used under much lower operating temperatures, e.g., within the range of 120 °C to 450 °C (see Ishibashi et al.: column 7, lines 43-57; also, claims 1, 7, 13 and 19).

Comments with respect to the rejection of claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 under 35 U.S.C. 103(a) as being unpatentable over Lane et al. (US 5,522,218) in view of Ishibashi et al. (US 5,330,732) and Keith et al. (US 3,331,787)

Applicant's arguments with respect to the combination of Lane et al., Ishibashi et al. and Keith et al. is based on the asserted deficiencies of Ishibashi et al. Thus, the same comments with respect to Ishibashi et al., as set forth above, similarly apply.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

^{DAL}
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June 20, 2007



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